

TO: Mr. F. E. Resnik  
FROM: R. M. Wiley  
SUBJECT: Coal Strength Testing Device

DATE: September 24, 1965

#### SUMMARY

A device and test procedure for measuring the coal strength of cigarettes have been developed with values being expressed as the percentage of coals removed during the test. The ~~coal strength~~<sup>percentage removal</sup> of Philip Morris and competitive brands was measured by this procedure and the values obtained range from 6% (P.M. Commander) to 63% (Salem) in coal removal (See Table I and Table II).

Many factors influence coal strength, such as the composition of the blend, the uniformity of the blend, and the physical form of the blend. The quality with which the cigarettes are made is also a variable. For example, cigarettes manufactured on Mark VI and Mark VIII makers are different in percentage coal removal (See Table III).

In limited testing, as the percentage by-product is increased the percentage of coal removal increases. However, there are exceptions to this general statement which may be caused by factors other than the amount of by-product added. Cigarettes with increasing percentages of DAP-BL, TFP, and RKS in a Marlboro blend made to the same RTD in the Semi-works at R & D, were measured for coal removal. Cigarettes containing 15 and 20% DAP-BL showed a greater percentage of coal removal than did cigarettes containing a like amount of TFP or RKS. These data are shown in Table IV. Data on other studies are included in Table V.

#### TEST PROCEDURE

This device, testing 25 cigarettes simultaneously, is reproducible in its action and free of operator influence. (See Figure I). The number of coals removed are recorded, thus the percentage coal removal obtained.

PM3000857868

Twenty-five cigarettes are inserted in the holding bar with 50 mm of the rod protruding. A vacuum is pulled on all the cigarettes and all of the cigarettes are lit simultaneously with an electric lighter. The cigarettes statically burned 0.5 minute prior to testing.

A variable speed motor turns a two inch eccentric cam, at a constant 21 rpm, which lifts the holding bar to the point of free-fall. The bar falls repeatedly with the anvil contacting the strike plate thus the cigarettes are subjected to repeated strain at the char line. The test continues for four minutes consuming approximately 40 mm of the tobacco rod.

For commercial brands, testing 100 cigarettes will yield results within  $\pm 10\%$  (absolute). To obtain results within  $\pm 5\%$  (absolute), 400 cigarettes should be tested.

All cigarettes are conditioned prior to testing at 75°F and 60% RH.

RMW:rab

cc: RADO

